Feb 20-59 Power Box 1X2 25W4 25BQ6
Tubes Tested OK

MARKUS TV DETECT-O-SCOPE

FAULTY TV TUBE FINDER

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by McGraw-Hill Book Company, Inc.
Based on Markus'
TELEVISION AND
RADIO REPAIRING

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TUNER

6AK5	6CB6	2AF4	6AB4	6BJ6
6BC5	6J6	3BC5	6AF4	6C4
6BK7	6U8	4BQ7	6AG5	6T4
6BQ7	6X8	5J6	6AT7	7F8
6BZ7	12AT7	5X8	6AU6	12AV7
			6BH6	12AZ7

Stage Names: 1st R-F Amp; 2nd R-F Amp; R-F Amp; Converter; Mixer; Oscillator

HOW TO USE

1. Locate trouble symptoms in table below and note probable sections having bad tube.
2. Locate suspected sections on diagram and try new tubes in stages specified by name.
3. If stages are not identified in your set, use tube lists in dials on chart. (For simplicity such letters as G or GT after tube numbers have been dropped.) Try replacing tubes in shaded sections at left first, as these are the tubes most commonly used in those sections.

Stage Names: 1st Sound I-F; 2nd Sound I-F; Limiter; Intercarrier Sound Amp; Sound Detector; Audio Detector; Ratio Detector; F-M Detector; F-M Follower, Discriminator; A-F Amp; Audio Output

SOUND

6AL5	3BN6	6AT6	6SF7	7X7	25BK5
6AQ5	5AQ5	6AW8	6SH7	12AT6	25Z6
6AU6	5T8	6BA6	6SJ7	12AT7	50L6
6AV6	5U8	6BH6	6SK7	12AU7	
6K6	6AB4	6BK5	6SN7	12AX7	
6T8	6AG5	6BN6	6SQ7	12L6	
6V6	6AG7	6CB6	6U8	12SN7	
6W6	6AQ7	6L6	6Y6	12SQ7	
25L6	6AS5	6S8	7C5	19T8	

VIDEO IF

6AG5	3AU6	6AN8	6H6
6AL5	3CB6	6AU8	6T8
6AU6	5AV8	6BC5	6U8
6BA6	5U8	6BH6	12AL5
6CB6	6AC7	6BJ6	12AT7
12AU7	6AM8	6CF6	12AU6
			12AX7

Stage Names: 1st Video I-F; 2nd Video I-F; 3rd Video I-F; 4th Video I-F; Video Detector; AGC; AGC Rectifier; Keyed AGC; AGC Keying; 2nd Detector; AGC Amp; AGC Delay; AGC Detector

VIDEO AMP

6AC7	6AN8	6CL6	6U8	12AT7
6AG7	6AQ5	6K6	6V6	12AV7
6AH6	6AU6	6SJ7	6W6	12BH7
6CB6	6AW8	6SN7	6X8	12SN7
12AU7	6BF5	6U6	7C5	25L6
12BY7				

Stage Names: Video Amp; Video Output; 1st Video Amp; 2nd Video Amp; D-C Restorer

SYNC

6BE6	5AV8	6BN6	6SQ7	7B4
6C4	5U8	6BY6	6SR7	7N7
6SN7	6AB4	6CS6	6U6	12AV7
12AT7	6AL5	6SH7	6U8	12BZ7
12AU7	6AN8	6SK7	6X8	12SN7
12AX7	6AU6	6SL7		

Stage Names: Sync Amp; Sync Clipper; Pre-sync Separator; Sync Limiter; Sync Level; Sync Clamper; 1st Sync Separator; 2nd Sync Separator

Stage Names: Vertical Amplifier; Vertical Oscillator; Vertical Sweep Generator; Vertical Multivibrator; Vertical Sweep Output; Vertical Output; Vertical Sync Amplifier; 1st Vertical Amplifier; 2nd Vertical Amplifier

VERT

6BL7	6AN5	6C4	6U8	12AU7
6S4	6AQ5	6J5	6V6	12AX7
6SN7	6AN5	6K6	6W6	12B4
12BH7	6AV5	6SH7	7B5	12SL7
12SN7	6UF6	6SJ7	7C5	12W6
	6Q6	6SK7	7N7	25L6
	6BX7	6SL7	12AT7	50L6

HORIZ

6AL5	5U8	6BY5	7C5	19BG6
6AX4	5V4	6CB6	12AT7	25AX4
6BG6	6AC7	6CU6	12AX4	25CD6
6BQ6	6AQ5	6J5	12BH7	25CU6
6CD6	6AQ7	6K6	12BQ6	25L6
6CM7	6AS7	6SK7	12BZ7	25W4
6W4	6AU4	6SL7	12CU6	25Z6
12AU7	6AU5	6V3	12SL7	35Z5
12AX7	6AV5	6X4	12SN7	50B5
25BQ6	6BH7	7B5		

Stage Names: Horizontal Sweep Generator; Horizontal Oscillator; Horizontal Oscillator Control; Horizontal Output; Damper; Horizontal Multivibrator; Sync Amp; Pulse Amp; Horizontal Discharge; Horizontal AFC; Sync Phase Inverter; Horizontal Phase Detector; Horizontal Discriminator; Sync Discriminator; Horizontal Control; AFC Discriminator

HIGH V

1B3	1AX2	6Y6	35L6
1X2	2V3	25L6	

Stage Names: High-voltage Rectifier; High-voltage Doubler; High-voltage Oscillator

LOW V

5U4	5AU4	6X5	
5Y3	5V4	25Z6	
	6AX5	50Y6	
	6X4		

Stage Name: Low-voltage Rectifier

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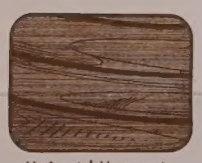
Examples of Symptoms Due to Tubes or Controls

Entirely Dark
TRY: Brightness Control
Contrast Control

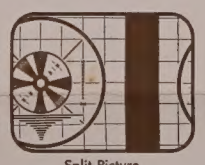
Only White-Line Raster
TRY: Station Selector Switch
Fine Tuning Control

Blurred
TRY: Focus Control



Horizontal Movement
TRY: Horizontal Hold Control
Horizontal Drive Control
Horizontal AFC Control
Horizontal Frequency Control
Horizontal Lock Control
Contrast Control

Vertical Movement
TRY: Vertical Hold Control



Split Picture
TRY: Horizontal Phase Control

Too Narrow & Distorted
TRY: Width Control
Horizontal Linearity Control
Horizontal Drive Control
Horizontal Peaking Control

Too Shallow
TRY: Height Control
Vertical Linearity Control
Vertical Centering Control

Distorted at Top
TRY: Vertical Linearity Control
Height Control
Vertical Centering Control

Off Center
TRY: Horizontal Centering Control

Sound Bars
TRY: Fine Tuning Control

Tilted Picture
TRY: Rotating the Deflection Yoke

Common TV Trouble Symptoms and Probable Locations of Bad Tubes

Trouble Symptoms Seen and Heard (Raster is obtained by tuning to channel having no program)	*Probable Sections Having Bad Tube*	
	Separate Sound	*Intercarrier Sound*
No picture; no raster; no sound	Low-V	
No picture; raster OK; no sound	Tuner; Video I-F	Same plus Video Amp
No picture; no raster; sound OK	High-V; Horiz; Picture Tube	
No picture; raster OK; sound OK	Video I-F; Video Amp	Video Amp
Picture weak and washed out, but raster and sound OK	Video I-F; Video Amp	Video Amp
Picture and raster both weak even with brightness control full on; sound OK	High-V; Horiz	
Picture too bright, and contrast control does not work; sound OK	Video Amp; Picture Tube	
Picture all black and white (no grays), and contrast control does not work; sound OK	Video Amp; Picture Tube	
Picture and raster too dim, and retrace lines are visible; sound OK	Vert	
Picture muddy and gray (insufficient contrast); raster OK; sound OK	Video Amp	
Picture wiggles and weaves, lacks blacks, or is very black; raster OK; sound OK	Sync; Video I-F	
Picture is jittery with double image but not ghost; raster OK; sound OK	Horiz (output tube)	
Picture has engraved effect; raster OK; sound OK	Video Amp	
Picture has maximum brightness, and brightness control has no effect on picture or raster; sound OK	Picture Tube	
Picture has snow on all channels; raster OK; sound is weak	Tuner; Video I-F	Same plus Video Amp
Picture has snow on all channels; raster OK; sound OK	Video I-F; Video Amp	Video Amp
Picture and raster both fuzzy or blooming, and brightness may go on and off; picture cannot be focused; sometimes hissing heard; sound OK	High-V; Picture Tube	
Picture drifts sideways, tears sideways, or breaks up into moving diagonal patterns; raster OK; sound OK	Horiz; Sync	
Picture drifts up or down but not sideways; raster OK; sound OK	Vert	
Picture drifts both sideways and vertically; raster OK; sound OK	Sync; Vert; Horiz; Video I-F	
Picture drifts both sideways and vertically and does not fill screen; raster also too small for screen; sound OK or weak	Low-V	
Picture OK on weak stations but jumps or tears on strong stations; raster OK; sound OK	Video I-F; Video Amp; Picture Tube	Video Amp; Picture Tube

Trouble Symptoms Seen and Heard (Raster is obtained by tuning to channel having no program)	*Probable Sections Having Bad Tube*	
	Separate Sound	*Intercarrier Sound*
Picture intermittently on; raster OK; sound OK	Video I-F; Video Amp	Video Amp
Picture and raster both intermittently on and off; sound OK	High-V; Horiz; Picture Tube	
Picture and sound both intermittently on and off; raster OK	Tuner; Video I-F	Tuner; Video I-F; Video Amp
Picture, raster, and sound all intermittently on and off	Low-V	
Picture and raster both are compressed or squeezed together either at top or at bottom; sound OK	Vert	
Picture is compressed or squeezed together either at right or left side (not linear horizontally); raster OK; sound OK	Horiz	
Picture folds over on itself at side; raster OK; sound OK	Horiz	
Picture and raster both have alternate dark and light horizontal hum bars; sound may have hum	Low-V	
Picture has alternate dark and light horizontal bars; raster OK; sound OK	Video Amp; Tuner; Video I-F	
Picture and raster both have white horizontal bar at bottom or top; sound OK	Vert	
Picture spoiled by white horizontal lines; flashes of white lines in raster; sound OK	Vert	
Picture and raster both have faint dark vertical line followed by light vertical area; sound OK	Horiz (output tube)	
Picture and raster have vertical bars at right side; sound OK	Horiz (osc tube)	
Only thin horizontal line on screen; no raster; sound OK	Vert	
Only thin vertical line on screen; no raster; sound OK (can occur only in very few sets)	Horiz	
Picture and raster fill screen vertically but not horizontally at sides; sound OK	Horiz; Low-V; Sync	
Picture and raster fill screen horizontally but not vertically at top and bottom; sound OK	Vert; Low-V	
Picture and raster do not fill screen either horizontally or vertically; sound OK	Low-V	
Picture and raster both enlarged, so too big for screen; sound OK	High-V; Horiz	
Picture and raster enlarge excessively when brightness is increased; sound OK	High-V	
Picture and raster OK; sound is weak, distorted, noisy, raspy, intermittently fading in and out, has howling or squealing, or there is no sound	Sound	